Successful Methods

Construction - Road Making - Engineering - Industrial - Mining

Vol. 5. December 1923 No. 12

for Industrial Housing

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They are fire-safe—which reduces insurance.

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Successful Methods

A Magazine of Construction Service

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Vol. 5 DECEMBER, 1923 No. 12

On to Chicago

THE selection of the time for an average business convention is a difficult problem, as it is always certain to inconvenience many of those who feel it necessary to attend. The annual Convention and Road Show of the American Road Builders' Association present no such problem, as they are held at a season when the highway industry is at a standstill in a greater portion of the country and all the men engaged in it are free to go to Chicago, attend the sessions of the Convention and visit the Road Show.

As has been announced before in SUCCESSFUL METHODS, the 1924 Convention and Road Show will be held Jan. 14 to 18, and give every promise of being a greater success in every way than any of their predecessors. Those in charge of the convention ask all who expect to attend to make their hotel reservations at the earliest possible moment. Applications for the reduced railroad rates which will be in effect and registration for the convention itself should all be attended to as far in advance as possible.

Every one who attends the convention will be well repaid for the time and money spent.

Are You Alive to This?

CONSTRUCTION work is going ahead this winter on a tremendous scale. All over the cold winter States contractors are arranging to carry on an amount of work that would have seemed fantastic only two or three years ago.

Organizations of builders all over the country have been studying intensely the comparative costs of summer and winter work. Members of the New York section of the National Congress of the Building and Construction Industry have gone very thoroughly into the labor phases of the proposition. Walter Roberts, chairman of the committee on seasonal employment of that section, recently was quoted as follows:

> "We must forget now and hereafter that there is any such thing as a winter halt in building.
>
> "That is a bygone idea. Advanced methods render building as advisable and economical in winter as in summer. We have studied 92,300 actual cases among 150,000 workers in our city building trades and we declare positively that there is no good reason why construction should not go on irrespective of the seasons. If owners, contractors or architects do not yet comprehend this situation, our committees stand ready to give them the latest information as to executing all details of their operations just as well in winter as any other time."

Other committees of the Congress have considered detailed methods and costs of handling various kinds of construction work during cold weather. One committee reported that a saving of $87,700 was made last winter on an apartment house costing $750,000. This big saving was due to new methods of handling work at low temperatures and to lower costs of both material and labor, with greater efficiency among workers.

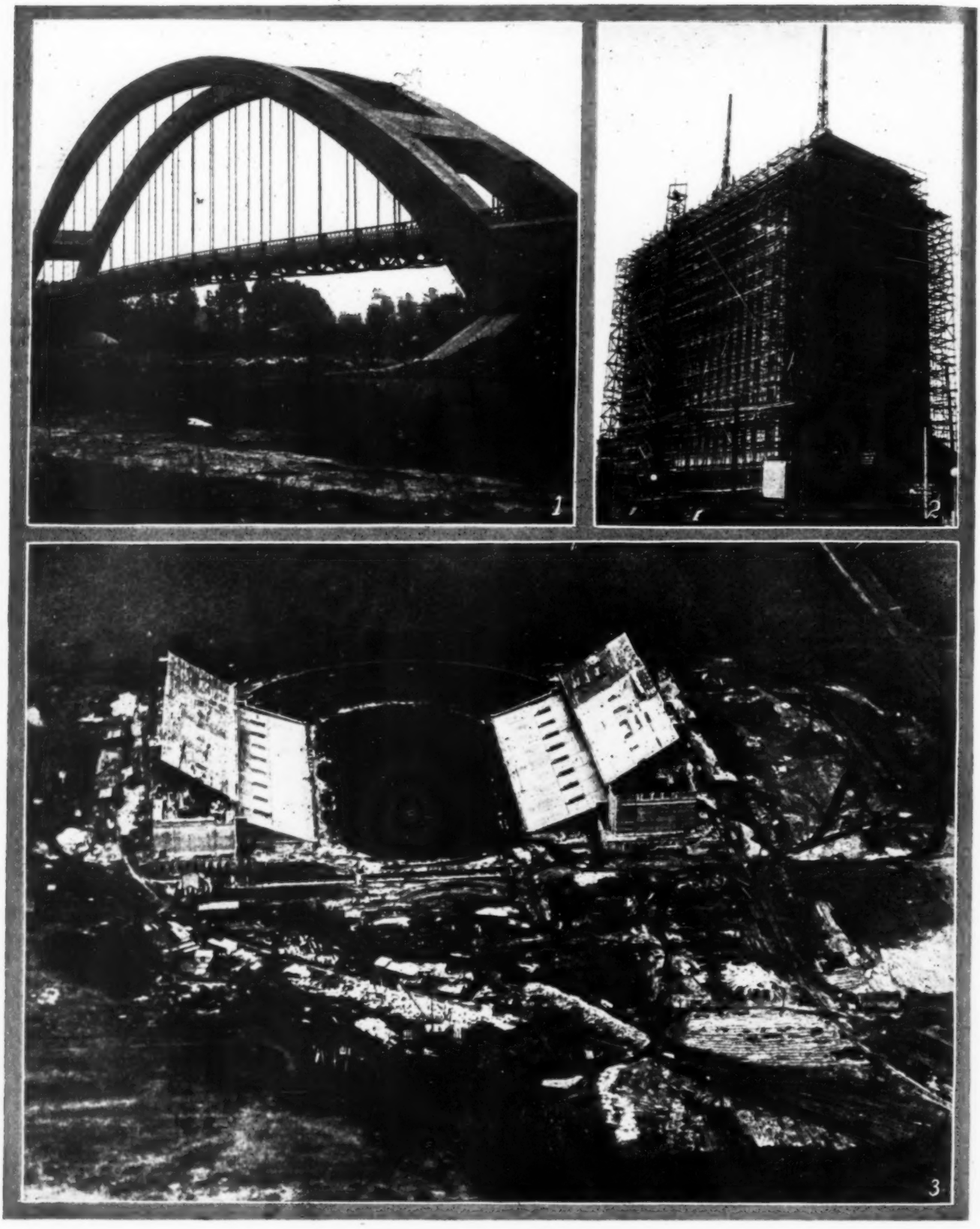
Record lettings of new work were made in the cold winter States in October and November. These show that many owners and architects are alive to the savings that can be made, under present conditions, by pushing work right through the winter. Contractors who keep ahead of the hounds also are alive to the opportunity for them presented by all-year-around work. Some contractors are still closing up with the first freeze, just as we put our automobiles away with the first snow a dozen years or so ago. Look into this winter work idea. It is here to stay.

Our Guests

SEVERAL of the leading British manufacturers of Portland cement are visiting this country. They are primarily interested, of course, in studying American methods of producing and marketing cement. They further have a keen desire to see how cement is used in this country. They also will doubtless give special attention to the various activities of the Portland Cement Association, which have been so effective in improving and extending the uses of concrete in the United States. They certainly will find much of great value to them in the physical investigations and in the educational work of that association. Their whole visit will be, however, largely an inspection of the American construction industry. It, therefore, behooves all who are fortunate enough to come in contact with them to tell them what they want to know.

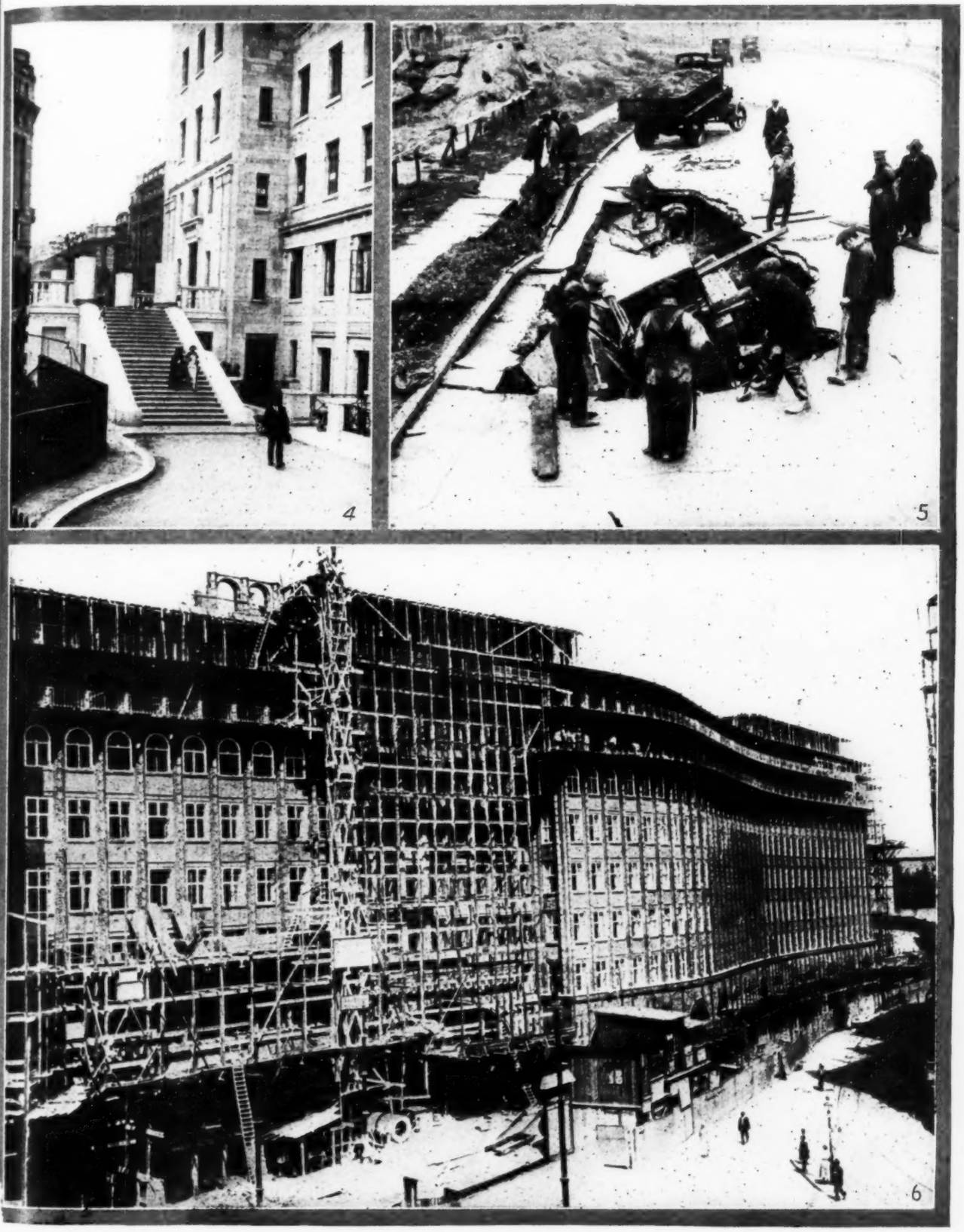
This idea of disclosing our trade secrets to foreign competitors may not appeal to many. Some of our American cement producers come into the keenest kind of competition with the British makers of certain of the world's markets. Our American manufacturers have found that the British, as they say play "good cricket," or as we say "clean ball." In a word, they are good competitors. So it is up to all Americans who come in contact with these British visitors, or with any of the many other visitors from abroad interested in our construction industry to show them that we also know how to play good cricket.

Some New Types



1—A graceful bridge which has been built over the Seine north of Paris. © *International*
2—This new office building in Fresno, Cal., will have every room equipped with radio. © *P & A Photos*
3—The giant double decker stadium which seats approximately 72,000, built by the University of Illinois. © *P & A Photos*

Of Construction



—London has gone in for short-cuts and this handsome stairway connects Aldwych and the Strand. © P & A Photos
—A non-permanent pavement in New York City which turned a motor truck into a wreck. © P & A Photos
—Despite the depreciation of the mark, they are still putting up big buildings in Germany. This one is in Hamburg. © P & A Photos

MOVABLE MIXING PLANT PROVES ITS WORTH

Handles Work on Lock in Ohio River Below Louisville

By Capt. W. F. Heaney,
U. S. Army, Louisville, Ky.

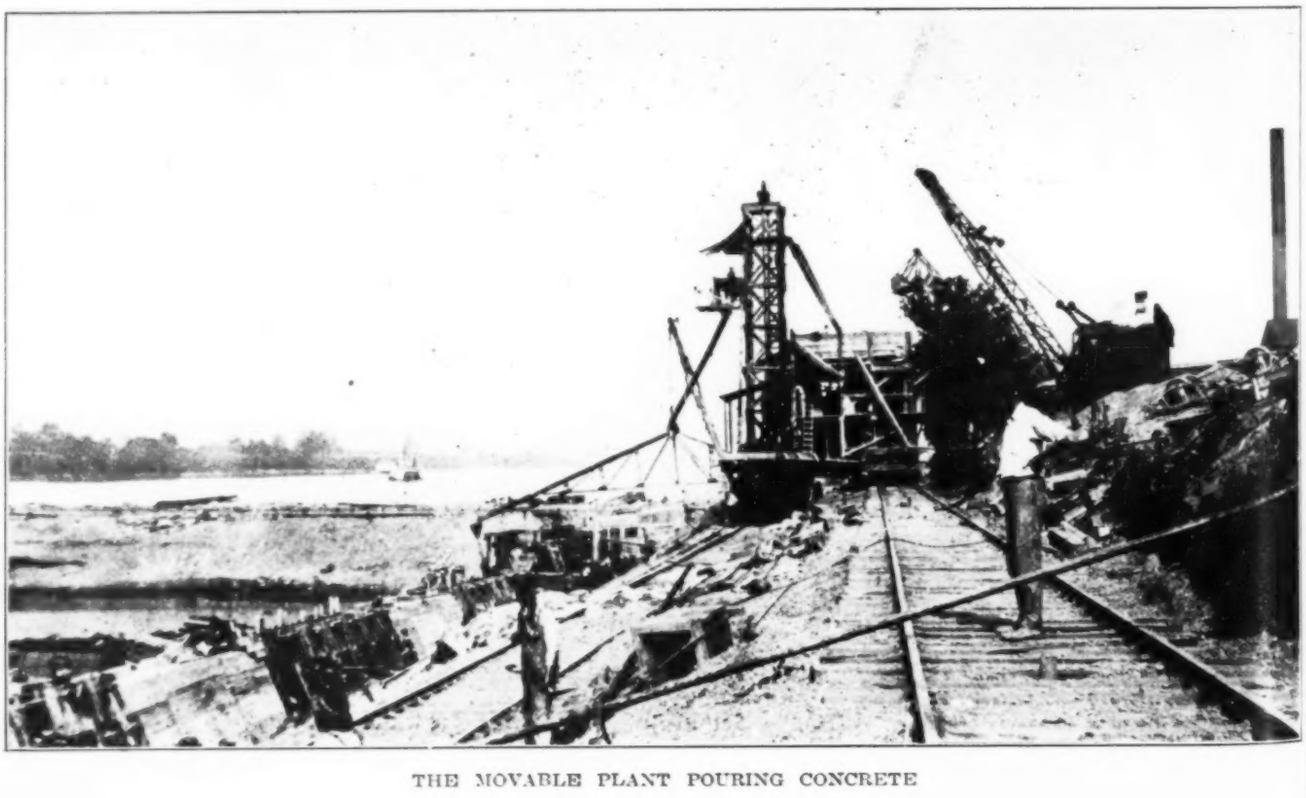
IN the construction of the lock at Dam 45, Ohio River, at Addison, Ky., 70 miles below Louisville, Ky., a movable gravity plant mounted on standard gage tracks is being used for concrete mixing and distribution. The problem at this lock is to pour about 40,000 cu. yd. of concrete along two walls, a land wall of 1100 ft., including the sections of the upper and lower guide walls within the lock coffer, and a river wall of 785 ft., 110 ft. from and parallel to the land wall. The coffer was completed in the season of 1922, thus allowing concrete work to commence as soon as the river fell to a favorable stage, which happened about July 1, 1923.

The river stages in the vicinity of Dam 45 being such as to limit the working season in the coffer, built for a 16-ft. stage, to an average of about four months per year, it is necessary to plan to complete all the concrete work of the year's task within that period of time. Also it is advantageous to complete all the work in the lock coffer in one season, so that the cofferdam may be removed during the winter and work started on the pass cofferdam at the beginning of the following working season. This, then, necessitated planning to clean out coffer, prepare footings, etc., and pour the entire 40,000 cu. yd. in a four months' period.

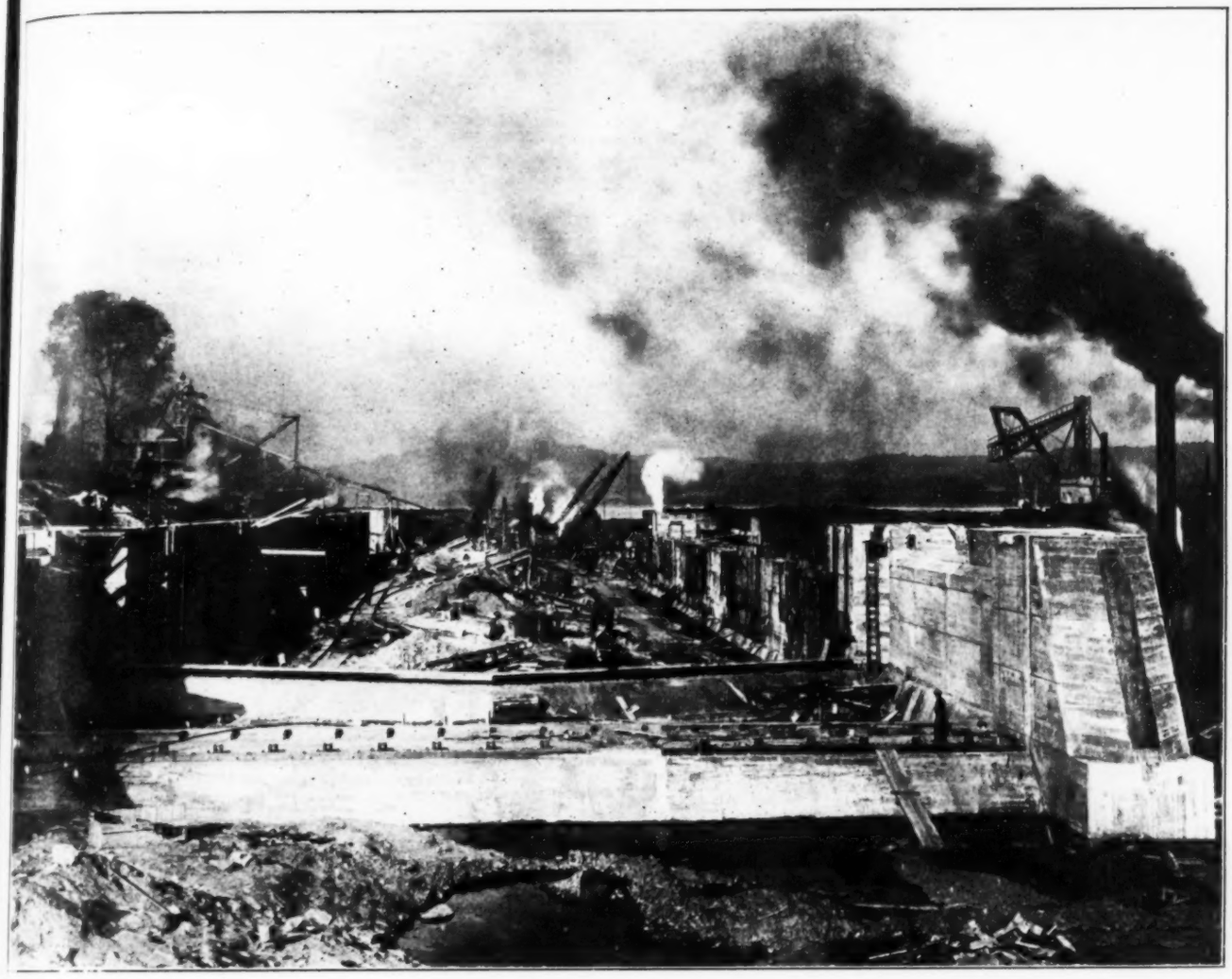
The topography of the river bank on the lock side is particularly suited for laying tracks approximately parallel to the land wall and for storing sand and gravel. Because of this, and also in order to prepare as much as possible for concreting in advance of unwatering the coffer, it was decided to use a movable gravity plant for concrete mixing and distribution. The tracks were laid, mixing plant built, and a large amount of aggregate (about 16,000 cu. yd.) stored accessible to the mixer before river stages fell enough to allow the coffer to be unwatered. The preliminary preparations also included the building of nearly all the forms, most of which were made interchangeable, and the erection of cement sheds, etc.

The mixing plant moves on two standard gage tracks laid on 20-ft. centers, the one next to the lock being 6 ft. lower, to conform to the slope of the bank and thus reduce the grading necessary for roadbed. A third track was laid on top of the bank and 30 ft. from the upper mixer track for a locomotive crane which is used for feeding the sand and gravel bins from storage piles on the bank, as well as for handling to storage piles the sand and gravel, which is brought up an inclined track from barges by steam locomotive and dump cars of 16 cu. yd. capacity. The upper mixer track is connected to the yard tracks, thus allowing cement in railroad cars to be moved, as received, to the mixer and unloaded on to an inclined belt conveyor which carries the cement direct to the mixing platform of the concrete plant. This reduces cement handling to a minimum, since with mill tested cement and a fairly uniform rate of delivery, very little of the cement received during the working season goes into the cement sheds, they being used only for the reserve supply.

The movable plant was designed and constructed by H. G. McCormick, U. S. Assistant Engineer in local



THE MOVABLE PLANT POURING CONCRETE



A GENERAL VIEW OF THE LOCK. THE MIXER CAN BE SEEN AT THE LEFT

charge. As the design was based on equipment and materials already in stock, it was in some ways made to suit the equipment on hand rather than what would have been the most suitable. Essentially the framework of the plant consists of a wooden tower 50 ft. high, supported by an A-frame with stiff legs, resting on a platform of 18-in. I-beams, which in turn rests on a standard 80,000-lb. flat car on the lowest track and on three sets of trucks on the middle track. The hoisting engine, mixer and engine, sand and gravel bins, and small shed for cement are all placed on the framework. The mixer itself is a 1-yd. non-tilting drum type. It discharges directly into the hoisting bucket when in its lowered position at the bottom of the tower.

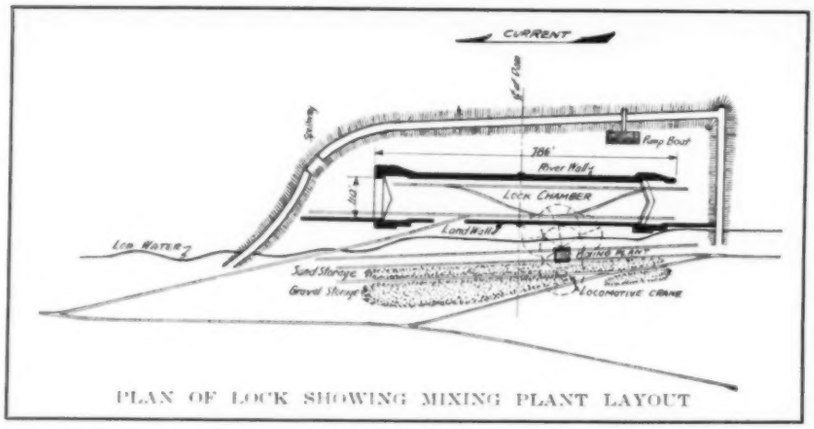
Current supply of sand and gravel is stored in separate overhead bins, capacity about 20 cu. yd., each of which is kept constantly filled by the locomotive crane on the upper track. These bins discharge by lever controlled sliding gates into the batch hopper, the top of which was set at the mixing floor level. The required amount of cement is dumped into the measuring hopper by hand, sack measurement being used. Water is admitted through a 3-in. pipe from a barrel fitted with a graduated gage, the flow being controlled by a quick-acting lever valve.

The lower lifts of the river wall, the upper and lower miter sills, the land wall and the sections of the guide walls included in the coffer are poured direct from the concrete mixing plant by chute. With the plant as designed, it is necessary to rehandle the concrete for the upper lifts of the river wall. This is done by locomotive crane and bottom dump buckets. It would have been possible by increasing the height of the tower on the mixing plant to pour the upper lifts of the river wall direct also, but it was decided that, as the yardage involved was not large and as the use of bottom dump buckets would not delay the pouring to any great extent, it would be more economical to limit the height of the tower to 50 ft. and rehandle the concrete for the upper lifts of the river wall.

The maneuvering of the boom and counterweighted extension chute is very easily done, and great flexibility in placing the concrete at any desired point in the forms is obtained. Care was taken in the design to place the pivot points at the foot of the boom and the chute connection to the tower hopper, as well as the boom line connection at the top of the tower, all in the same vertical line. This permitted the boom to swing freely through 180 deg., while the counterweighted extension chute had a swing of 360 deg.,

thus allowing the discharge spout to reach any point near the plant except the small area directly in its rear.

The boom chute and the counterweight chute are each 48 ft. long. A slope of 1 on 3 is used, thus making the extreme reach of the chute about 90 ft. horizontally from the receiving hopper. By adding additional chutes this is increased as desired, though with some loss of flexibility. Changing the location of the plant on the tracks is only a matter of a few minutes delay, the handling being done with a 25-ton locomotive. The results obtained with this plant are satisfactory. Delays are infrequent and never of long duration. As much as 425 cu. yd. of concrete has been poured in one 8-hr. shift, an average of almost a yard a minute for the entire period.



PLAN OF LOCK SHOWING MIXING PLANT LAYOUT

The plant and methods described possess the following advantages:

(a) All preliminary work necessary for the actual placing of concrete can be done prior to the opening of the construction season.

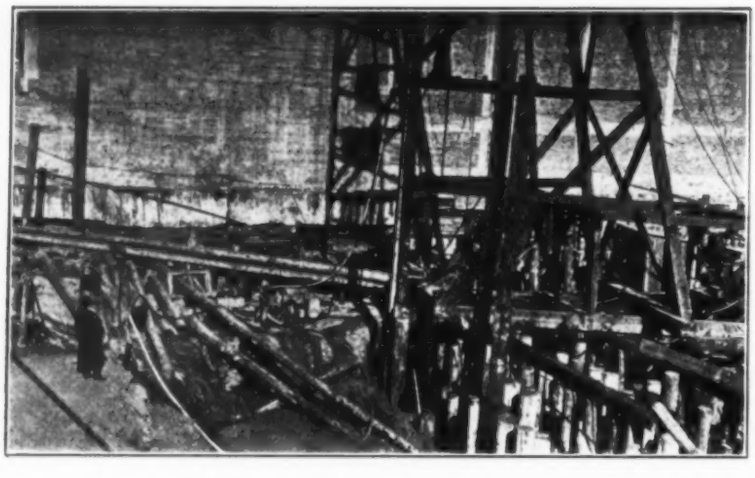
(b) A large amount of aggregate (16,000 cu. yd. in this case) can be secured in advance of the rush season and stored accessible to the mixer without rehandling.

(c) Non-interference of concrete operations with other work inside the lock chamber.

(d) Elimination of concrete tracks and handling equipment inside the cofferdam.

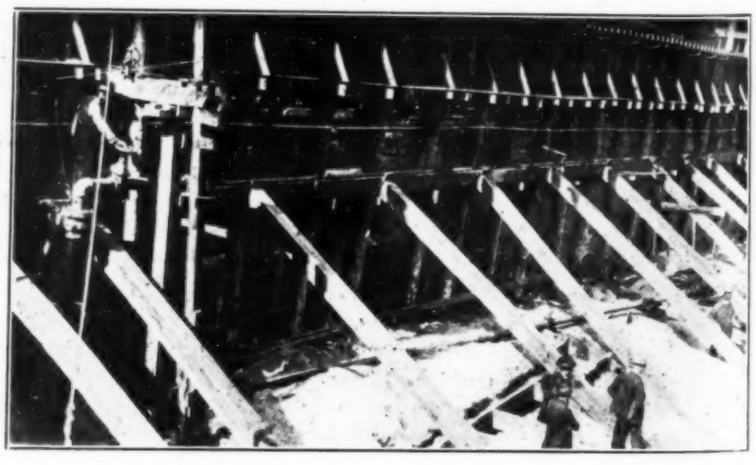
The cost of the concrete so far placed indicates that this method of concrete distribution is cheaper than that used on similar work elsewhere. The total unit cost of the first 18,000 cu. yd. was less than $9 a yard and the unit cost of mixing and placing the concrete was only $1.50 a yard, after distributing the net cost of the mixing plant over the entire yardage to be poured with it.

HIGH PRESSURE WATER SYSTEM HELPS DRIVE PILING



IN driving piling for the foundation of the new Pacific Gas & Electric Building in San Francisco there were some places where the earth was of such a nature that the piling could not be driven as far into the ground as was desired. The upper photograph shows three such piles, one being in position between the uprights of the pile driver. It was finally decided to ask the city for permission to use the high-pressure water system in helping to drive the piling to the proper level.

It so happened that a pipe leading from the high-pressure system extended a few feet into the excavation, as shown at the left in the lower photograph. Connection was made with this and a valve installed for controlling the flow of water. A large hose was then connected to this pipe and extended to a long pipe with a gooseneck near the top. When the high-pressure water was turned on, a stream of water under great pressure flowed from the end of the long pipe, which was lowered and raised alternately by the winch on the pile driver, the water washing a hole for the pile. When the pipe had reached the desired level the water was shut off and the pipe withdrawn from the hole, after which the pile was easily driven to the proper level.



REPAIRING A RESERVOIR

By G. W. Maker

FOURTEEN years ago the town of Douglas, Mass., built a circular reinforced concrete reservoir 45 ft. in diameter and 19 ft. high. This reservoir had been in use only a few years when it developed leaks.

The Aberthaw Company, specialists in reinforced concrete design and construction, was called on to make a report on repairing this reservoir. Investigation showed that the concrete in the walls had been placed at three different times, that is, with two construction joints completely around the tank. Apparently these joints had not been properly cleaned and roughened before placing the succeeding section of wall which resulted in the water seeping through, washing out the laitence, and in cold weather freezing and spalling off the concrete on the line of the joints.

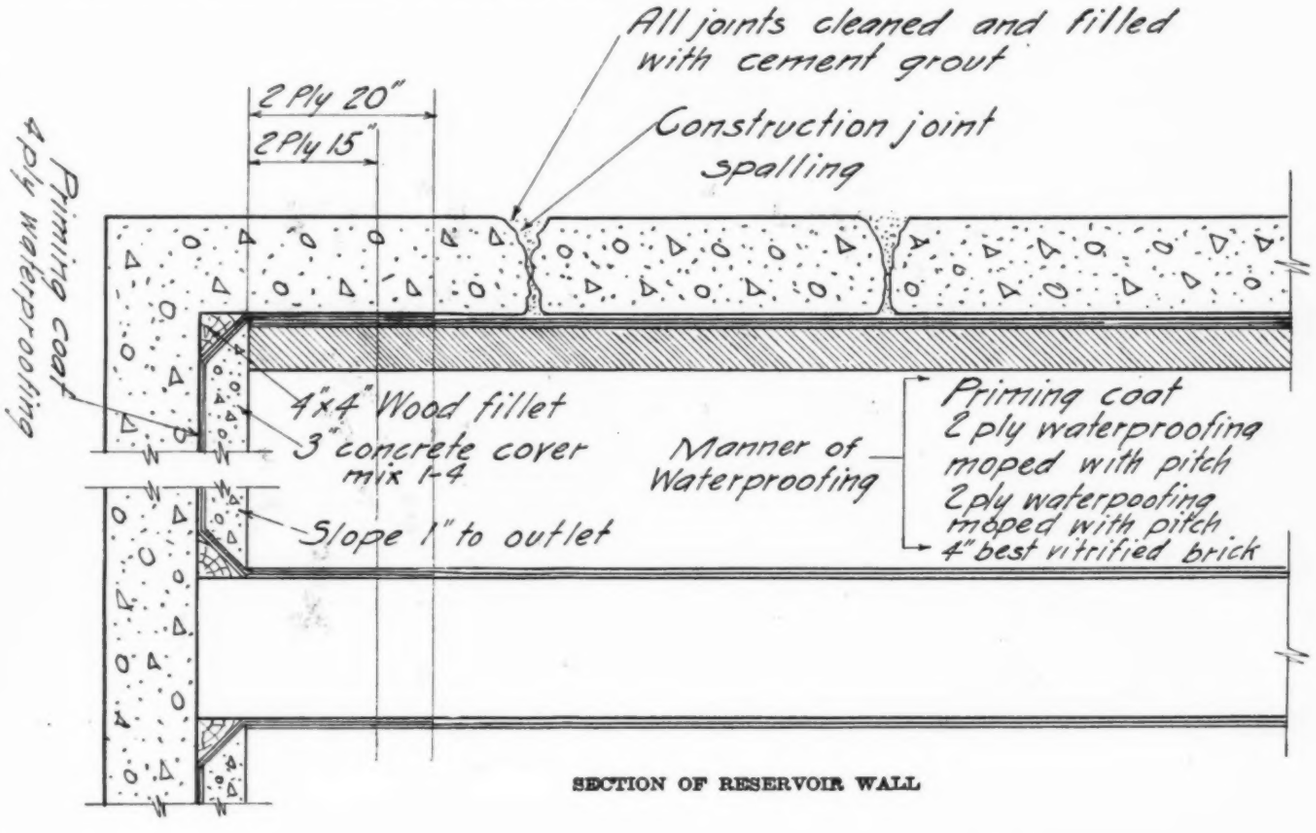
The accompanying sketch shows a section of the reservoir wall and the method of repair which was briefly as follows: The poor joints were carefully and thoroughly raked out, both inside and out, a few feet at a time and cleaned of all laitence and loose concrete. These joints were then plastered back with a mixture of cement and sand in 1:2 proportion, the old concrete first being thoroughly wet.

After the concrete was repaired the inside of the tank was waterproofed in the following manner: The tank was thoroughly dried out with salamanders, which were kept burning four days, heat being circulated by means of several electric fans.

At the intersection of wall and floor a line of 4-in. 45 deg. angle, wood fillet was laid completely around the tank. Four plies of ordinary roofing felt mopped on with pitch were then laid, the first two piles being extended 20 in. up the walls and the second two plies 15 in. up the walls. This felt was also carried the same distance up each of the four concrete columns which supported the roof of the tank. This felt on the floor was protected with 3 in. of concrete, which was placed in a careful manner so as not to injure the felt waterproofing. The felt waterproofing was then applied to the walls in the same manner as to the floor, except that the walls were thoroughly mopped with hot pitch before the felt was applied. The felt on the walls was placed vertically in three belts approximately 7 ft. high.

It was apparent that this vertical waterproofing would not hold to the wall when the tank was empty as during the application it showed a tendency to slip. Accordingly, to prevent this slipping and also to provide a protection for the felt, a single course of vitrified brick was laid the full height of the wall in 1 to 3 Portland cement, water to which was added a small amount of hydrated lime. A joint approximately ½ in. wide was left between the waterproofing and the brick and particular care was taken to thoroughly fill this with water as each course of brick was laid. Particular care was used to thoroughly bed the brick to insure watertightness.

On completion of the work the tank was completely filled with water and a close inspection failed to disclose any sign of leakage. The cost of this work was approximately $4,000. The reservoir now seems to be permanently watertight.



SECTION OF RESERVOIR WALL

AN EARTH-FILLED DAM IN NEW ENGLAND

Big Structure Across Deerfield River Is Almost Finished

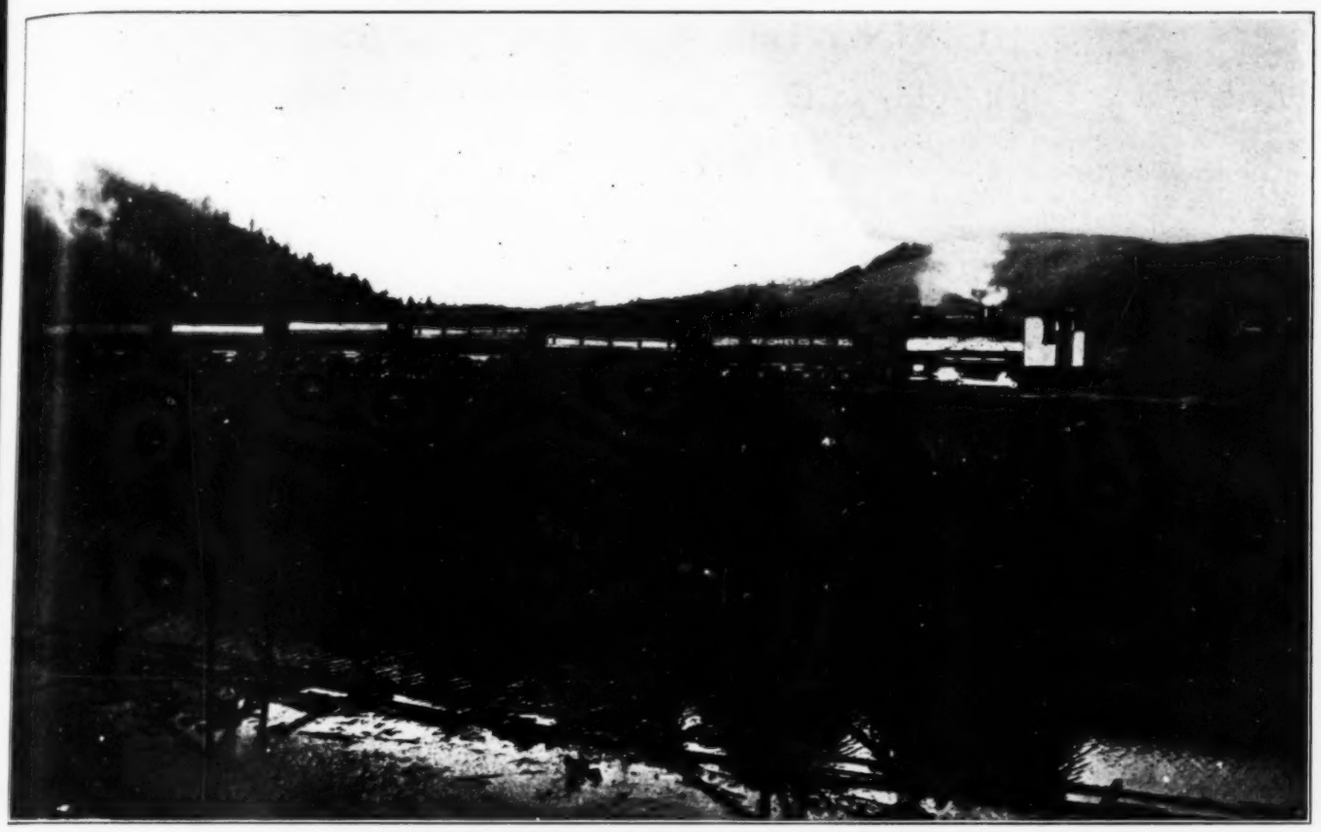
AFTER two years of construction work at Readsboro, Vt., the largest earth-filled dam will be completed. It will supply hydro-electric power to the large power system of the New England Power Co., which has already extensive power lines in New Hampshire and Massachusetts.

The 500-ft. fall from the dam to a point five miles down river, where the power houses are built, will give 40,000 hp., and it is planned to supply in addition 20,000 hp. with the installation of an added generator, which can be taken care of by the tremendous water power available. The dam measures 1500 ft. in length, is 200 ft. high, with a width at the base of 1300 ft. and 25 ft. wide at the crest.

It is constructed of earth taken from the location. This earth has the desired amount of clay in it, and the hydraulic method is used in its construction. Work was started September, 1922, and will be completed December, 1923. For a few months in the winter of 1922-23 the work was held up by excessive snow and cold weather.

The spillway is of unusual design and resembles an inverted phonograph horn. This will carry any excess rise of water through a tunnel under the dam, so that the water level will not rise above the top of the spillway at any time of year. The diversion tunnel is 1500 ft. long and was built first to carry any flood during the construction of the dam.

A GENERAL VIEW OF THE DAM. THE UPPER PHOTOGRAPH SHOWS THE UNUSUAL CONICAL SPILLWAY



A TRAIN OF DUMP CARS FILLING IN THE EARTH CORE

The reservoir, formed by the new dam, will be 10 miles long and cover an area of over 3 sq. miles. This area has been cleared of several houses and the main road through the valley had to be relocated. There are 1500 men on the job, 8 steam shovels, 15 locomotives and 102 dump cars.

The present work on the dam has reached the point where there are two embankments of earth 200 ft. high, running parallel across the Deerfield River, and the space between the two embankments is now being filled from the dump trains which run out on the tops of the embankments. An inlet allows sufficient water to run into the space to mix with the earth dumped in, and the puddling of the two makes a hard fill which will fill up the intervening space to the level of the present embankments. Above the 200-ft. level of earth another 14-ft. embankment will be built, which will make the total height of the earth construction about 214 ft. The level of water will rise to the 200-ft. level and the spillway will take care of excess water so that it will not rise above the desired level.

The new transmission line to handle this new power extends from Readsboro, Vt., to Millbury, Mass., from which point it will be distributed. The estimated cost of this project is $10,000,000, which includes the cost of the transmission line.

MACHINES AND MOUNTAINS

THE average city dweller finds it pretty hard to exist in the country, and most country boys have a hard job adjusting themselves to city life. A good machine, however, gets along equally well no matter what the conditions, as is illustrated by the two reproductions of SUCCESSFUL METHODS covers at the bottom of the page.

The cover on the left, which appeared in February of this year, shows a bucket loader working in the Canadian Rockies with a high mountain peak in the background. The right-hand cover, which is the one used on this issue, shows a machine of the same type giving equally good service in the streets of New York with Manhattan's highest peak, the Woolworth Building, rising behind it.

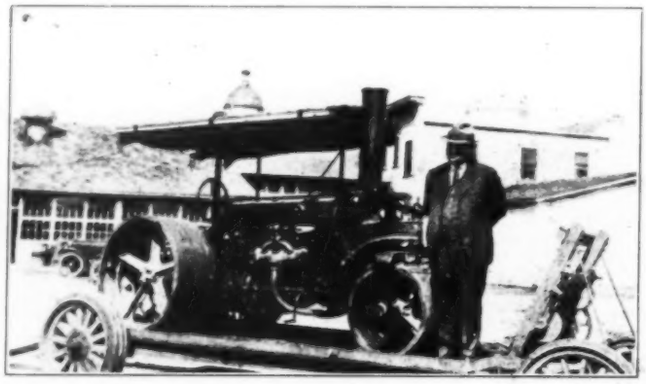
A well-made machine, properly taken care of, pays no heed to its environment. It works along steadily, handling its job without a murmur, and never objects to being picked up and transported to another clime. It has many advantages over its maker, man, who can always find a good reason why he should be allowed to do just as he pleases and go where he pleases. And that alone is sufficient cause for putting reliance in machines. The elimination of hand labor on any construction job is pretty certain to cut costs for the contractor. Good machinery pays its own way if it gets a fair chance.

GIVING THE ROLLER A RIDE

Home-Made Truck Adds to Efficiency of Highway Maintenance Equipment

By E. A. Bonney

MANY years ago, when some of us were getting started in kindergarten, or the lower grades of public school, it was the practice of developing spelling, reading and writing by copying quotations and bits of wisdom, and one of these which always remained in the mind of the writer was, "Every cloud has a silver lining."



THE HOME-MADE TRUCK IS STRONG ENOUGH TO HOLD BOTH INVENTOR AND ROLLER

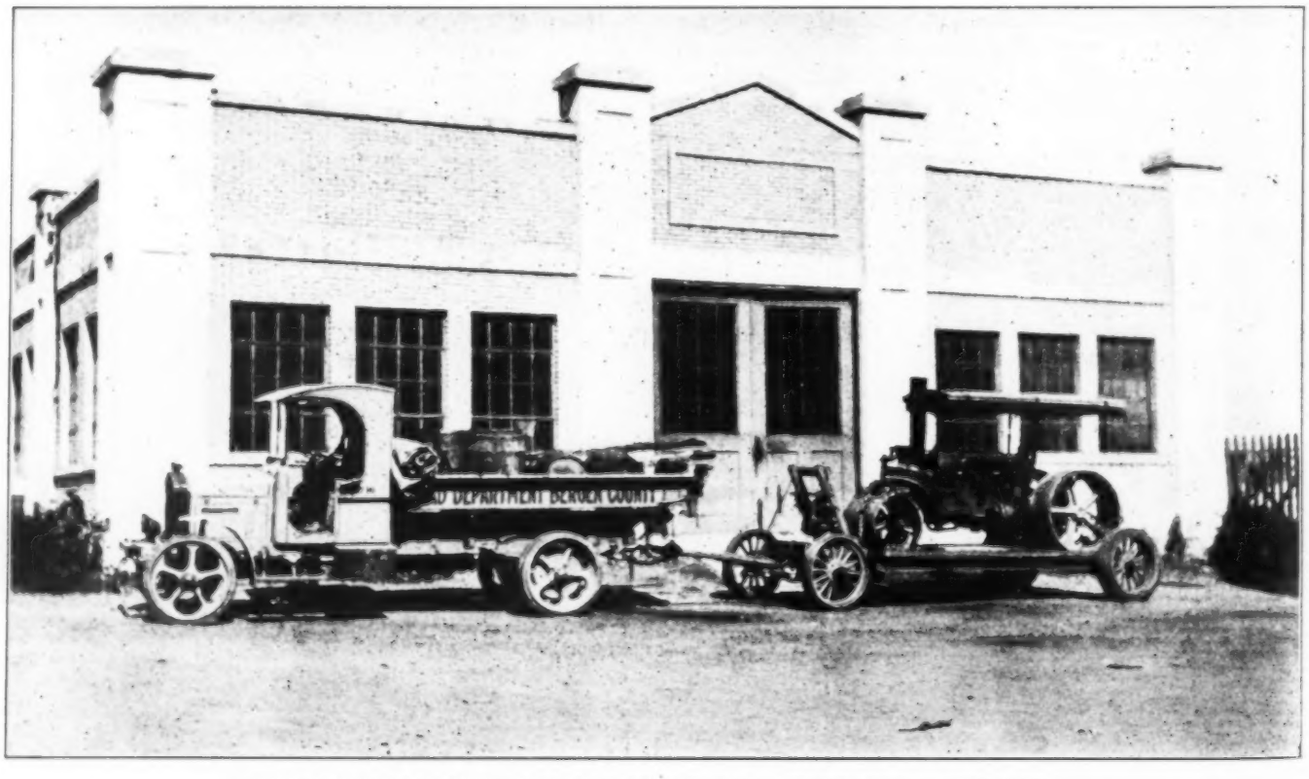
These six words did not mean much in those days, but they have become peculiarly applicable in the last few years, to business men, contractors and engineers allied with the type of work to which the pages of Successful Methods are devoted.

In the last few years one of the major problems has been the shortage of labor, and it has been interesting to see how this labor shortage was met by the individuals affected. Some of them promptly became discouraged, curtailed their work and refused to bid on further projects, but the majority, accepting this shortage as a permanent menace to their present methods of prosecuting their work, turned to machinery which could be used or adapted to eliminate hand labor. We do not state that this search for new methods has been confined to the last few years, but we do claim that greater strides have been made since we were confronted by an acute labor shortage than ever before, and this brings us back to a repetition of the old statement of the cloud and its silver lining.

Where a machine was invented and developed which would eliminate labor, cheapen the cost and speed up the work, it proved a boon to all concerned. The contractor was benefited, the manufacturer procured additional business, and the public gained through decreased cost.

There is no need to devote any space in this article to the growth of highway construction throughout the United States. Its development has been so rapid that it is self-evident.

Where roads are built, however, they must be maintained, and we do not believe that the public has fully awakened to the necessity for a well-equipped



THE LITTLE ROLLER ON ITS PRIVATE CAR READY FOR A JOURNEY

maintenance organization to keep the highways in the condition that every owner of a car or truck demands. A rut cannot be allowed to develop. Depressions and openings must be immediately refilled and resurfaced. The edges of the road metal, which wear off from continuous traffic, must be maintained, and the shoulders of the highway likewise must be kept in condition. In many localities a "gang" system has been developed to accomplish this work, with a motor truck to carry patching materials and the necessary tools. Until 1923 the custom was general of spreading bituminous cold patch material on the road and letting traffic consolidate it, or of tamping it in place by hand. Either method was open to criticism. The former gave opportunity for fast-moving vehicles to whirl the material out of place, and the tamping generally resulted in an uneven surface.

This year brought a small gasoline roller, manufactured in 3-, 4- and 5-ton sizes, and capable of economical and continuous operation on such maintenance work. The results obtained from its use were generally conceded to be far superior to former methods, but a criticism of the machine has been made many times by various officials and maintenance engineers that its speed, or, rather, lack of speed, was a disadvantage. It is interesting to see how one official, J. E. Thier, Supervisor of Roads of Bergen County, N. J., handled this supposed difficulty. He used his roller extensively on the 250 miles of county roads already built, moving it short distances under its own power or transporting it on a trailer hauled by the truck which carried the materials, when traveling long distances. This trailer was made by Mr. Thier in his own shop from second-hand truck axles and wheels procured from an automobile "graveyard." We have no figures on the labor cost, but his master mechanic told us that the material cost was under $100. One photograph shows the machine starting out for work from the county storehouse. Another gives a closer view of the roller and Mr. Thier on the trailer.

He states that the cost of operation of this roller is nominal and that all through the season of 1923 he has had no repairs, and he emphasizes the fact, as another advantage of such a roller, that anyone who can drive a Fordson tractor is a roller operator.

It is a joy and relief to encounter an official of this calibre, who instead of looking for limitations on his equipment devises new methods of obtaining additional improved qualities.

DYNAMITE USED TO OPEN TRENCH FOR PIPE LINE

AN interesting use of dynamite took place recently in the work of constructing the pipe line which is to carry the water supply to the city of Liberty, Sullivan County, N. Y., from a source some nine miles away in the Catskills. The new work will consist of a 10-ft. pipe from Lily Pond and is being put in by the Liberty Water Works at a cost of $130,000. One of the important parts of the job was the cutting of a trench for the pipe through a section of swamp which began about 2000 ft. from Lily Pond, the source of supply. This small swamp or ravine had been gradually filled with sand, debris and muck and was regarded as more or less difficult to penetrate. In fact, it had been estimated that the cost of opening a trench for the pipe line through this section, which was about 1400 ft. in length, would amount to $2.85 per ft. This estimate was made at a time when it was not planned to do the work with dynamite but by another method.

William George, president of the water board, who had at one time seen a drainage ditch cleaned out with dynamite, suggested that the explosive could possibly be used in opening the trench. His proposal was supported by Frank Huggles, in charge of construction. F. T. Ransom, a member of the technical section of the duPont Company, was called in to go over the work and to report on the feasibility of the explosives method. Mr. Ransom had had wide experience in blasting out ditches with dynamite and was the man who supervised the series of ditches several miles in length which were cleaned out with explosives for the farmers of northern New York. Under his direction it was planned to blow the main trench and lateral ditches through the swamp with straight 50 per cent dynamite.

The job was completed in four days by six men. A trench about 1600 ft. long was opened up. It was 2½ ft. deep and ran on a grade to 6½ ft. deep at the intake manhole at Lily Pond.

The savings in cost over the estimate was rather remarkable. The actual outlay for the ditch by the dynamite method was in detail as follows: Labor, $120; engineers and other odd expenses, $150; 2100 lb. of 50 per cent straight dynamite, $525; electric blasting cap and wires, $5. To this might be added 10 cents per foot, which may perhaps be regarded as rather high for grading and other odd work necessary for laying the pipe. This would bring the total cost to $960. The lowest estimate previously made for the job by other methods was $3,990, so that the dynamite method meant to the city on that particular stretch a saving of $3,030.

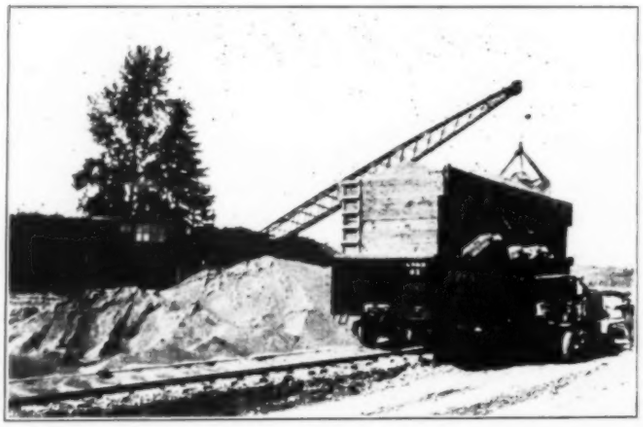
The propagated method was used in all the work. By this method the lines of dynamite cartridges put down are detonated by the explosion of one. The charges were spaced and depth of holes made for the dynamite to correspond or conform to the depth of ditch required. The dynamite method through the swamp was found successful not only because of its economy, but also because by means of the explosives, rock, stumps and debris are blasted out at one and the same time. The material is also thrown about over the landscape so that there are no spoil banks to drain back.

Dynamite is also being used in the remainder of the trench to loosen up hard clay and in breaking rocks.

BUILDING A CITY TO ORDER

Longview, Washington, Will House Workers in Big Lumber Mills—Construction Work Done on Large Scale

IN the southern part of the State of Washington, half way between Portland, Ore., and the Pacific Ocean, at the confluence of the Columbia and Cowlitz Rivers, a great city is being built to order. The new city will be known as Longview, named for R. A. Long, founder of the Long-Bell Lumber Company and chairman of the board.



BIN MADE BY ENLARGING OPEN TOP RAILROAD CAR

At Longview, the Long-Bell Lumber Company has commenced the construction of the largest two lumber mills in the world and will employ between three and four thousand men in the various activities there. As there were no living accommodations in the vicinity for so many men, it became necessary to build a city. The work started about a year ago and already there are thirty to forty business houses on the property, including a metropolitan hotel, six stories high, with from 200 to 300 rooms.

Longview has given an opportunity in city planning, which is being worked out by the firm of Hare & Hare, landscape designers and town planners, of Kansas City. The late George E. Kessler, landscape architect of note, was associated with the planning in an advisory capacity. The city is being built with a civic center distinct from the business center, from which broad avenues radiate diagonally, and will conform to the most modern ideas of city planning. The wholesale district, for example, will have a spur railroad running up each alley.

Gravel for the broad avenues of the new city is

GRADING IN LONGVIEW. HOTEL MONTICELLO IN BACKGROUND

LOADING 12-YD. AIR DUMP CARS WITH GRAVEL FOR USE IN SURFACING LONGVIEW'S STREETS

being handled in an unusual way. Instead of using dump wagons or trucks in hauling, standard-gage side dump cars have been installed of 12 cu. yd. capacity. Down the center of each street to be surfaced a standard-gage railroad track is laid. The gravel is hauled to the street in these dump cars and dumped to either side throughout the length of the street. The material is then spread by means of blade graders. It is a quick and economical way of accomplishing the gravel surfacing, made possible by the extensive scope of the work.

The building of this new city throws a sidelight on the timber situation in the country. Long-Bell Lumber Company has 11 mills in the South, with an annual output of 500,000,000 ft. of lumber products. The growing timber in the South is becoming exhausted and, with an eye to the future, this company has acquired 70,000 acres of Douglas fir in the State of Washington, containing, it is estimated, eight billion feet of growing timber. Tributary to this are something like 75 billion additional feet, all of which is expected to pass through the Longview mills. The two fir mills to be constructed will have a combined capacity greater than that of the 11 mills in the South.

A double-track railroad is being built to connect the mills with the timber tract and also serve as a public utility, while in front of the mills on the Columbia River there will be 60 ft. of water and docks from which ocean-going vessels can carry the products of the mills to any part of the world.

AMERICAN ROAD BUILDERS INVITE ALL INTERESTED IN HIGHWAYS

THE attention of those readers of SUCCESSFUL METHODS who are in any way interested in roadbuilding is called to the announcement of the American Road Builders' Association which is printed on page 19 of this issue.

Following the example of the last two years, the 1924 Convention and Show will be held in Chicago. The Congress Hotel has again been selected for the Convention, and the Road Show once more will occupy every inch of available space in the Coliseum and adjoining buildings. The Show will open on Jan. 14 at 8 p. m. and will close on Jan. 18 at 5 p. m. The sessions of the Convention will be held Jan. 15, 16 and 17. An unusually interesting program has been arranged for the Convention and the problems which must be solved in the near future by those engaged in roadbuilding will be discussed. On the morning of Thursday, Jan. 17, a joint session with the Associated General Contractors of America will be held.

The Coliseum, the Annex and the Greer Building are not large enough to house all of the machines of the manufacturers who applied for space, and this fact alone is indicative of the importance of the Road Show.

All of the railroad passenger associations in various parts of the country have arranged for reduced rates for the American Road Builders' Association convention. Those who attend may obtain one and one-half rate for the round trip to Chicago by making application for a certificate when they buy their tickets.

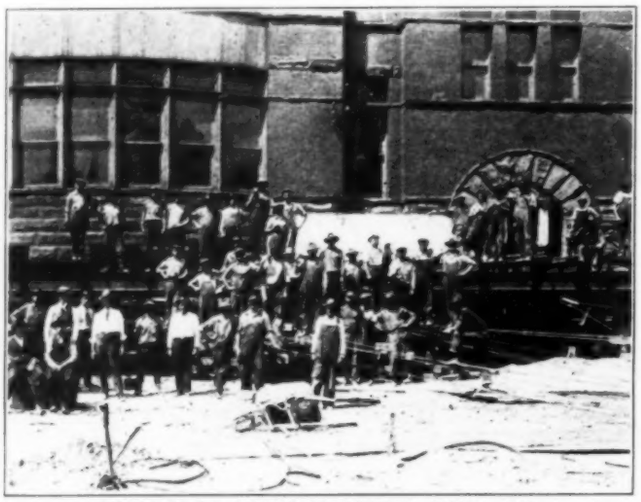
Chicago has ample hotel accommodations to take care of those who come to the Convention and Road Show, but it is advisable to reserve rooms in advance.

The American Road Builders' Association has issued a booklet giving information in regard to the 1924 Convention and Road Show. Copies of this booklet may be obtained by writing C. M. Upham, Convention and Show Manager, Congress Hotel, Chicago.

MOVING A BRICK HIGH SCHOOL

Structure Now Stands on New Foundation 400 Ft. from Old Site

EXCELLENT business judgment was shown by the Board of Education at Hammond, Ind., when the site of the Central High School was sold as the location for a new bank. The building itself was moved to a new site about 400 ft. distant. This new site is more desirable than the old one, as it is away from the noise of the car line and yet it is handy for transportation. The cost of moving the building and constructing the new foundation ran in the neighborhood of $60,000, but on the whole the Board of Education is ahead more than $100,000 on the deal.



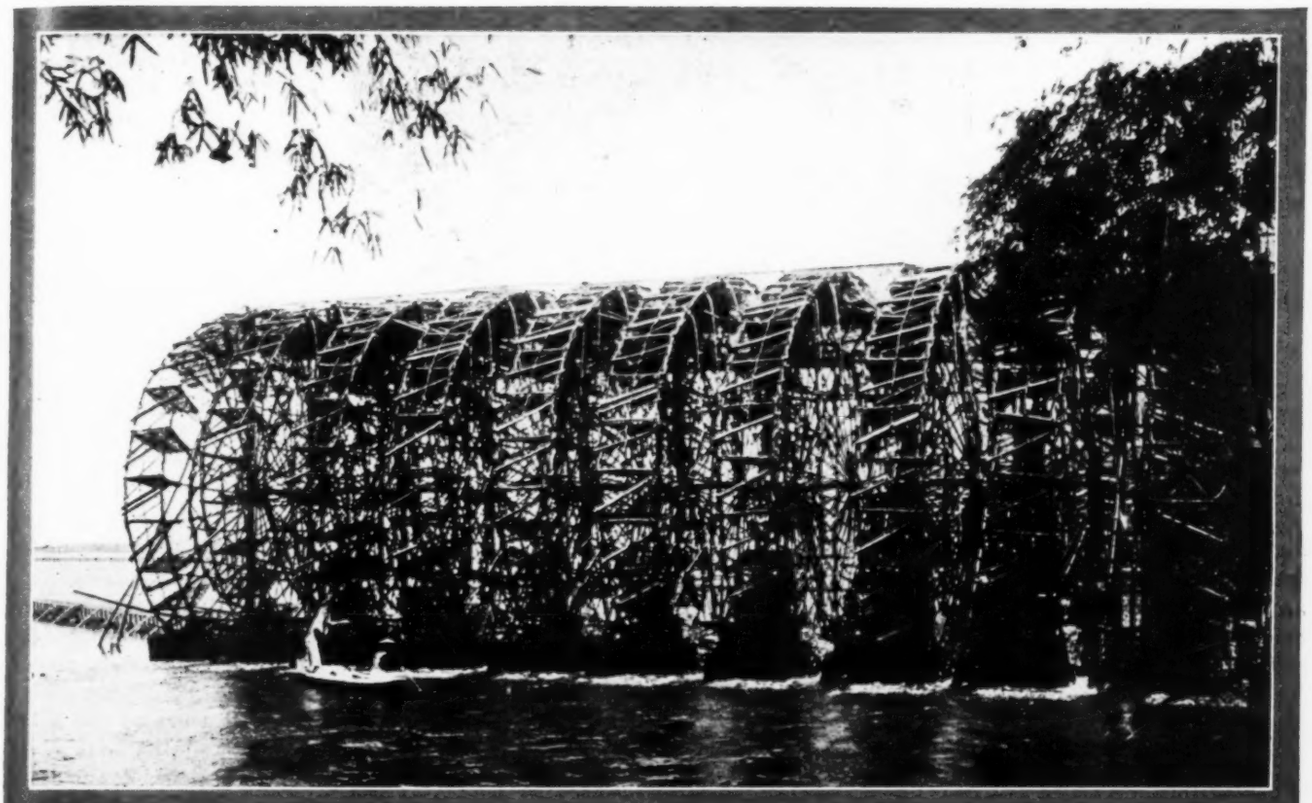
THE GANG THAT HANDLED THE JOB

The building was moved backward and given a turn of 90 deg., and what was formerly the rear of the building is now the front. In preparation the big stacks were removed to roof level. The building, which has a total weight of about 3500 tons, was moved on steel rollers and rails. On account of the wide bay windows, the load was well concentrated at certain points. Three teams were employed for moving, and by the use of a whistle it was possible to keep the teams moving uniformly. Because of the swing it was found that toward the finish of the work there was a heavier stress on one team than on the others. The foundation was all ready before the building was moved and the big building was safely loaded in its new location without any cracks or mishaps.

The work of moving was handled by the L. P. Friestedt Co., Chicago. J. Wesley Reed was the Hammond contractor. Their success in moving a brick structure of such size and weight without trouble was the result of careful planning and good organization.

FOUNDATION READY FOR HIGH SCHOOL WHICH MAY BE SEEN IN THE BACKGROUND. THE THREE TEAMS WHICH DID THE HARD WORK ARE AT THE LEFT

Two Variations of the Barrel Theme



The important-looking structure in the upper photograph is a water wheel built entirely of bamboo on a river in Indo-China. It possesses the virtue of being very easily repaired as spare parts can be obtained without cost in the nearby jungle. © *Keystone*

The contraption in the lower photograph is a New England invention and is used for making the streets passable when a snow storm appears on the scene. The inventors realized that in New England there isn't much use to try to clear the snow away. The best one can do is to pack it down. © *Keystone*

UNUSUAL METHODS IN BRIDGE CONSTRUCTION

Cofferdam Troubles Eliminated—Cableway Transports Material

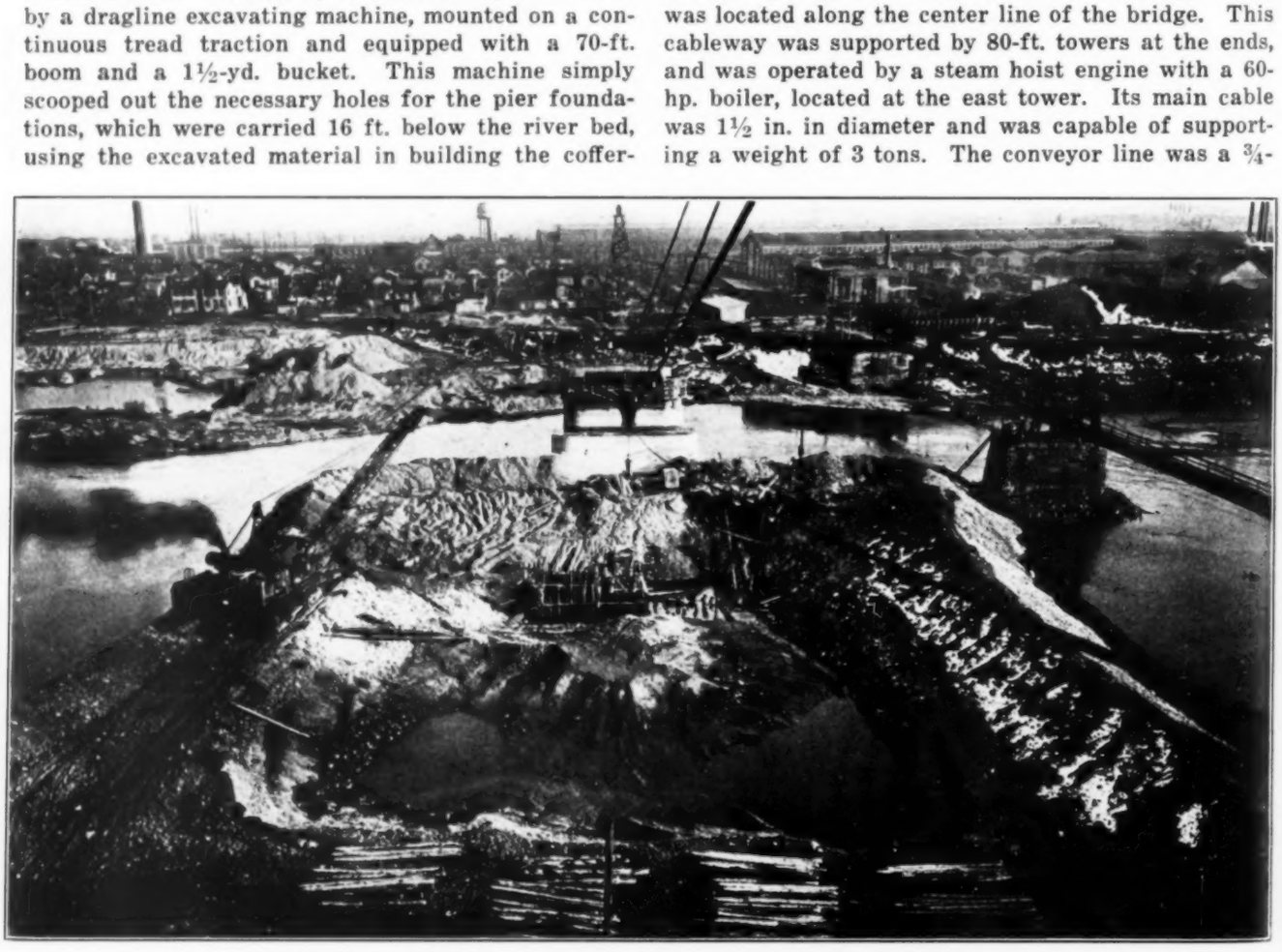
By Ivan E. Houk

THE unusual methods recently used by the Miami Conservancy District in building the 7-span concrete arch bridge across the Miami River on Black Street, Hamilton, Ohio, had so many advantages over the more customary methods that they deserve careful consideration. For instance, the cofferdam troubles, which generally cause considerable annoyance to the contractor, were eliminated by constructing huge earth inclosures around the locations where the piers were to be built, while the difficulties of serving the cofferdams and forms were overcome by installing an 800-ft. cableway reaching from one end of the bridge to the other.

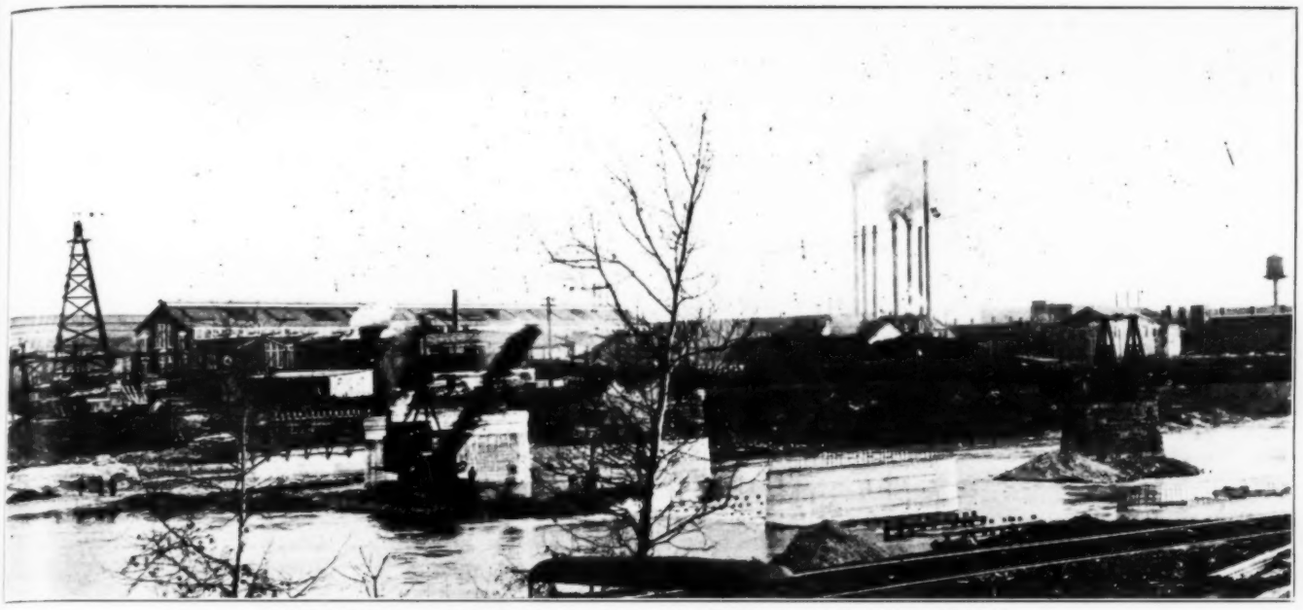
PILE DRIVER SUSPENDED FROM BOOM OF DRAG LINE

The earthen inclosures, or cofferdams, were built by a dragline excavating machine, mounted on a continuous tread traction and equipped with a 70-ft. boom and a 1½-yd. bucket. This machine simply scooped out the necessary holes for the pier foundations, which were carried 16 ft. below the river bed, using the excavated material in building the cofferdam walls, and making each cofferdam large enough to inclose two piers. As soon as each inclosure was completed the water was pumped out and the foundation construction started. The dragline was then used in driving piles at the locations where the piers were to be built, the pile driver leads being attached to the end of the boom. Approximately 150 piles, 20 ft. long, were driven under each pier, a number sufficient to support the entire weight of the bridge above, with no assistance whatever from the river bed material immediately under the pier footing.

Concrete, as well as reinforcing steel, form lumber, pumps, motors, etc., were transported to the places needed by means of the overhead cableway, which was located along the center line of the bridge. This cableway was supported by 80-ft. towers at the ends, and was operated by a steam hoist engine with a 60-hp. boiler, located at the east tower. Its main cable was 1½ in. in diameter and was capable of supporting a weight of 3 tons. The conveyor line was a ¾-



EARTH INCLOSURE BUILT AROUND PIER TO SERVE AS COFFERDAM



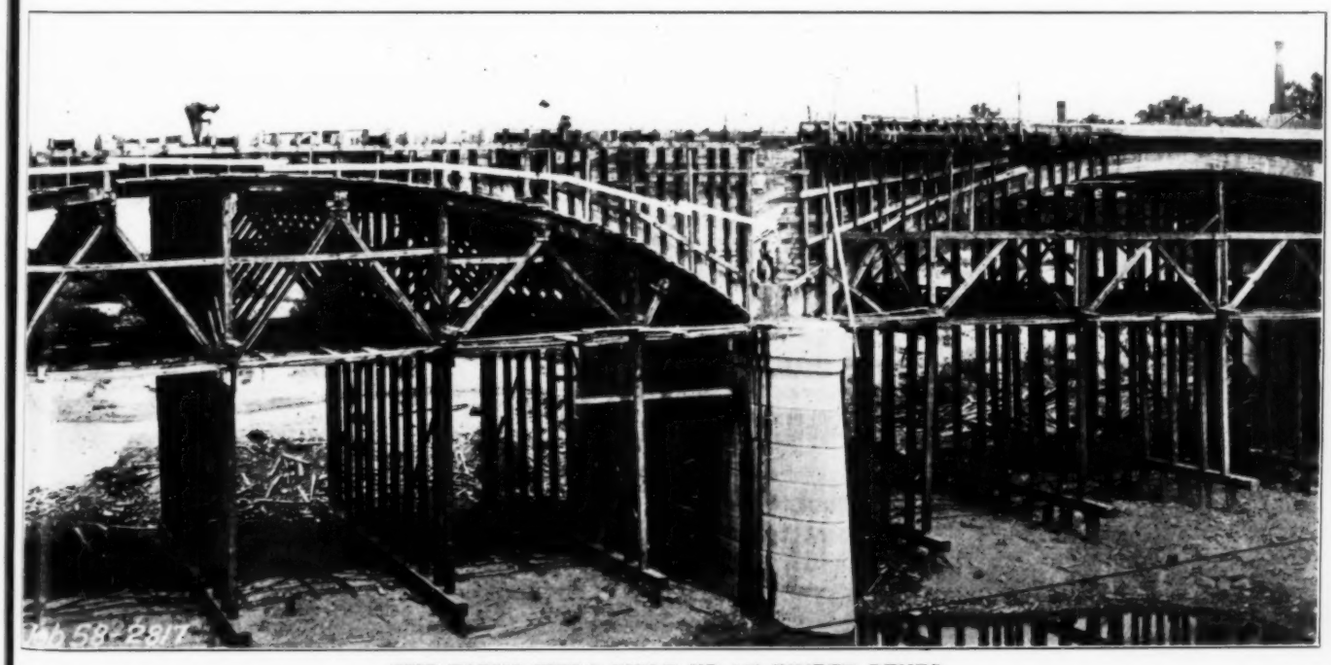
THE 800 FT. CABLEWAY SERVED COFFERDAMS AND FORM WORK

in. cable, the button line, a ¾-in., and the hoist line, ½ in., all cables being steel wire.

The concrete mixer, a 1-yd. machine, was located at the east end of the bridge. It was supplied with sand and gravel from the river bed by 1½-yd. rocker dump cars loaded at the stock piles by an electrically operated stiff-leg derrick, and hauled to the mixer by a 3-ton gasoline locomotive. For the piers and abutments bank-run gravel was used without screening, except for the removal of stones over 6 in. in size, the concrete being mixed in proportions varying from approximately 1-2½-5 to 1-3-6. However, in the case of the arch rings, spandrel walls, counterforts, etc., the material was separated and the concrete mixed in proportions varying from 1-1½-3 to 1-2-4.

Forms for the arch rings were built upon pile foundations. Five transverse rows of 11 piles each were driven for this purpose in each span before the form work was started. Timbers were cut with great precision and were fastened together with bolts wherever possible, so that they could be taken apart without damage and used again. The curves of the arch rings were laid out with great accuracy on a nearby tennis court and used in cutting templates for the joists and side forms.

When the concrete work was completed, the upper surfaces of the arch rings and piers, the counterforts and the backs of the spandrel walls, were waterproofed with a bituminous oil priming coat and three coats of asphalt alternated with two lays of impregnated cotton fabric. Weep holes, to care for the drainage, were placed at the piers and abutments, and were covered with 2 ft. of coarse stone screenings to permit the free movement of seepage water.

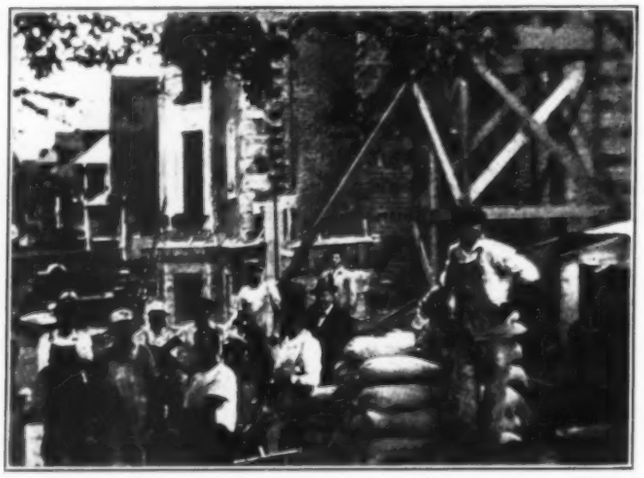


THE FORMS WERE BUILT UP ON TIMBER BENTS

UP-TO-DATE PLANT CUTS COSTS

THE problem of the high cost of labor is being successfully dealt with by a large number of building contractors in the State of New York, as for instance, the firm of Cuzzi Bros. of Mount Vernon. The accompanying picture shows three mechanical devices which are saving this concern considerable money: a gasoline driven hoist, a gasoline mixer and a number of concrete carts.

The operation on which these machines are being used is an addition to the church seen in the back-



ground, the addition consisting of a three-story building, each story having a concrete floor of about 35 by 70 ft. The top floor was poured in about 6 hr., the mixer delivering 7 cu. ft. every 2 min. and the hoist elevating it in two strips with the carts. Three carts were used, so that one of them was always at one end of the station while one was in transit. The walls went up at the same rapid stride, 200 to 220 bricks being lifted at each trip. Comparing this performance with the old-fashioned method of hod carrying, the investment made by Cuzzi Bros. is likely to pay for itself in a short time.

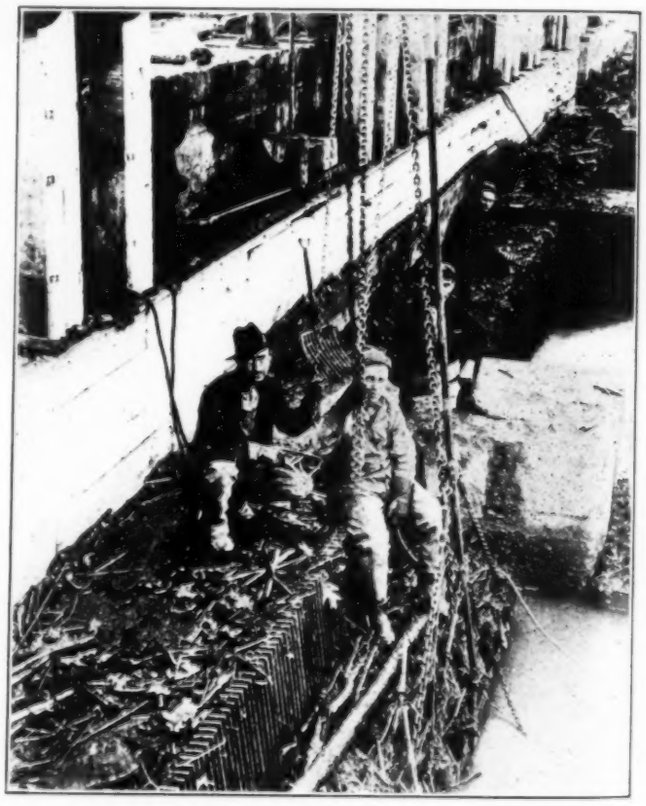
SPECIAL RAKE CLEARS FOREBAY

FEW hydroelectric plants have such a great volume of debris to contend with as is the case at the Morgan Falls station of the Georgia Railway & Power Co. At this point the surface of the Chattahoochee River is usually covered with trash and there is a great quantity of trash under water. The booms are of little value except to turn aside the upper layer. The spring freshets wash down tons of material, including water-logged stumps, branches, trunks and rails.

For many years W. C. Sullivan, superintendent of the Morgan Falls station, waged incessant warfare against this debris and most of the time he had to acknowledge that he was nearly beaten in the conflict. However, he set his inventive nature to work and devised an electric hoist rake that is doing the work in a highly satisfactory manner, with the result that now he feels that the trash problem has at last been solved. This rake is heavy and rigid. It seldoms gets out of order and besides, handles the material rapidly. This rake is made of structural steel. It has tool-steel teeth and a steel handle that slides through a short section of pipe attached to the motor-driven chain-hoist carriage. This hoist carriage in turn runs on a cable stretched between supports so that it runs over the top of the forebay racks.

About 24 ft. upstream from the racks and just above the water level is stretched a ½-in. guy wire that carries a dolly to which a ½-in. block and tackle is fastened for pulling the rake away from the racks while lowering it to take a load.

The rake proper consists of a 9-ft. L measuring 7/16 in. x 3 in. x 6 in., to which are fastened U-shaped teeth 27 in. long and slightly more than 3 in. between centers. Between the tips of two teeth at each end of the rake are welded strips that prevent the teeth from projecting through the rack. The handle of the rake, that consists of 1⅜-in. tool steel 35 ft. long, is flattened at its lower end and bolted to a piece of strap iron, which in turn is bolted to the rake cross-member. A ring is also fastened to this strap for attaching the chain from the motor-driven hoist and the block and tackle for pulling the rake away from the racks in lowering. Chains containing turn-



buckles at the upper ends tie the outer ends of the rake and intermediate parts to the handle.

The one-ton electric chain hoist is of the hook type and is equipped with a 35-ft. lift chain. In clearing away the trash that is raked onto the platform at the top of the racks, it has to be loaded on a flat boat with coke forks. The photograph shows the rake in operation and the character of the trash it has to pull up from the bottom.

THE AMERICAN ROAD BUILDERS' ASSOCIATION

Extends to all interested in the Construction and Maintenance of More and Better Highways a Cordial Invitation to its

TWENTY-FIRST ANNUAL CONVENTION

and

FIFTEENTH ANNUAL GOOD ROADS SHOW

Chicago, Ill., January 14-18, 1924

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The Road Show will be at the Coliseum and adjoining buildings, Jan. 14, 15, 16, 17 and 18, inclusive.

Reduced Railroad Rates (one and one-half fares) have been arranged by the various passenger associations in all parts of the country. Be sure to get a Convention Certificate when you buy your ticket.

Chicago Hotels have room enough for all.

THE AMERICAN ROAD BUILDERS' ASSOCIATION

FRANK PAGE, PRESIDENT

For further information write C. M. Upham, Convention and Show Manager, Congress Hotel, Chicago, Illinois

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